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of the state of Alabama any extensive deposits of phosphates or potash mineral fertilizers. We realize that more and more every year the success of our farmers seems to depend upon their use of these fertilizers, plus the general improvement of the soil. This is because of the fact that the phosphates, the potash and the nitrogen in our soils, the three great essential mineral articles of plant food, are being gradually used up, or washed out, and new supplies must be added artificially, in order that the plant may receive a sufficient quantity of these to meet its needs.

The millions of tons of coal which are yearly produced and consumed in the state of Alabama contain large quantities of nitrogen that ought to be saved and transformed into fertilizing materials. Furthermore, through not only your coal supply, but through the great water-powers that exist in Alabama, it will be possible to take nitrogen from the atmosphere and transform it into fertilizer materials for use under your crops.

You must also not only endeavor to find supplies of phosphate and potash in the state of Alabama, but, failing in this, you must produce other products that you may export in exchange for the phosphate and potash you may need to import. Furthermore, the systems of farming must be so modified as to diminish, year by year, soil exhaustion through the leeching out and washing away of these valuable constituents.

The mining industry and agriculture will go hand in hand in their efforts to build up and perpetuate the manufactures and other varied industries of this state, and will thus safeguard the public welfare for the future no less than that of the present.

The recent progress of this university and your geological survey, and the con-

struction and equipment of these new buildings which we celebrate to-day, are guarantees that Alabama's future as well as its present is in safe hands.

JOSEPH A. HOLMES

WASHINGTON, D. C.

CHARLES FAY WHEELER¹

It was with a sense of deep personal loss that the associates of Professor Wheeler learned of his death, March 5, at George Washington University Hospital. While those intimately associated with him were perhaps aware of his gradually failing strength, he was so cheerful in his greeting each day, so uncomplaining, that no one realized the extent or significance of his failing health.

The narrative of Professor Wheeler's early life indicates that his career as a botanist may have been the result of misfortune. Born June 14, 1842, at Mexico, Oswego County, N. Y., he spent his earliest years on the farm. In 1857 he entered Mexico Academy in his native town, but left that institution, as so many other young men left college at that time, to enter the army. He enlisted October 8, 1861, as a private in Company B, Seventh Regiment of the New York (Black Horse) Cavalry, to serve three years, but was mustered out with his company March 31, 1862. He again enlisted August 20, 1862, as a private in Company F, One Hundred and Forty-seventh Regiment of New York Infantry, to serve three years, and during the following winter was encamped with his regiment on the hill in the vicinity of the present location of Howard University. The exposure and hardships he was subjected to during this time proved too much for him to withstand, and on March 21, 1863, he was discharged by reason of disability, and in reality never fully recovered from the effects of service in the army.

Following his discharge from the federal army he was induced to go to friends at Hubbardston, Mich., where in the out-of-door life he led it was hoped he might regain his health.

¹ Read before the Botanical Society of Washington, May 28, 1910.

It was during this period of recuperation, spent almost wholly in the open air, that he became interested in the vegetation of the vicinity and began to acquire that intimate knowledge of plants that was later to ripen into an all-absorbing interest. As strength gradually returned a systematic study of the plants in his vicinity was carried on. In the autumn of 1866 Professor Wheeler entered the medical department of the University of Michigan, but after one year he returned to Hubbardston, where for the following twenty-two years he conducted a drug and book store.

During this period he was the center of the intellectual life of the village. The element of gain in connection with the business apparently entered very little into his consideration. It was a mere incident. The real purpose, the real interest of his life, was the study of his beloved plants and the lending of inspiration to others. He possessed to a remarkable degree that rare ability to create an interest in better things in all with whom he came in contact, no matter how lowly the conditions of their life might be. He formed many intimate friends among young and old, gave them an interest in science, and when they went away he corresponded with them. He sought out too people outside of his village who studied botany, and helped them. It was during this period that he laid the foundations of that rare and peculiarly intimate knowledge of plants that enabled him in his work in the Department of Agriculture later to name off-hand so much of the fragmentary material that no one else could recognize. He must also have become interested in the botany of drug material, for he certainly possessed a rare knowledge of this class of plants.

It was during the first years of his life in the drug store that he formed a lasting friendship with Dr. Erwin F. Smith, now of the Department of Agriculture, and together they planned a flora of Michigan which was published in 1881. This flora Professor Wheeler revised twelve years later in cooperation with Dr. Beal.

In 1889 his reputation as a painstaking systematic botanist was such that he was

called to the Michigan Agricultural College to be instructor in the botanical department, then as now under the direction of Dr. W. J. Beal, and 1895 he was made assistant professor.

The same qualities that endeared him to the people of his village quickly made a place for him in the new life and larger field he had come to fill. One of his associates of that time says:

No one was endowed more highly than he with that indefinable gift which arouses enthusiasm in students, and this quality, combined with a deep knowledge of his subject and a sympathetic, lovable nature, will cause him to be remembered and his memory loved by every student with whom he came in contact.

Professor Wheeler became a moving spirit in the intellectual life of the college community. There existed among the faculty at that time a literary circle, and whether the study of one of the modern languages, the reading of Molière or Shakespeare, was the object of their attention, Professor Wheeler was always the life of the gathering. He was extremely modest and shrank from participation in anything of a public nature, but among those whom he knew intimately he was at ease, and at these social gatherings of the college faculty it was indeed a pleasure to hear him read Shakespeare, for which he had a special fondness.

During the first years of this college life he was associated with Gilbert H. Hicks, whose death a few years ago was so keenly felt by many department workers. These two men working with Dr. Beal were responsible for the development of the botanical garden and the herbarium of over 100,000 specimens. The latter was formed entirely after Professor Wheeler's connection with the college, the old one having been destroyed by fire. Both the garden and herbarium are among the best, if not actually the best, of any similar institution in America. While at the college Professor Wheeler was occupied a part of the time with regular college studies and was graduated with the class of 1891, receiving the degree of bachelor of science. In 1907 his

alma mater on the occasion of the semi-centennial celebration of the college honored him with the degree of doctor of science. This was bestowed in the presence of the President of the United States, the representatives of many American and foreign institutions of learning, and before an audience of perhaps 20,000 people. To his students, however, he will always be known as "Professor Wheeler."

Well known to many in the Department of Agriculture, he was induced in 1902 to come to the department, where he entered upon systematic work in the Bureau of Plant Industry, and continued in this work until about two weeks previous to his death. His intimate associates during this time were frequently impressed with the wide experience and knowledge that Professor Wheeler possessed—an experience and knowledge acquired only through years of study of the same plants, both in the herbarium and in their natural haunts, and a knowledge not always possessed by the herbarium botanist. Professor Wheeler was not a mere collector, but a real student in the field, and so he was able to do a work in the department that perhaps no one else could do.

He was elected a member of this society in November, 1902, very soon after his coming to Washington, and was its president for the year 1907-08. His address as retiring president of the society was entitled "Thirty-six Years with Michigan Plants."

Professor Wheeler belonged to what we often term "the old school," the type of scientist represented by such men as Chester Dewey, William Oakes, John Torrey and many others that might be mentioned. He knew plants intimately and loved them. He knew something of other sciences and the relationship of systematic botany to them. His was a broad outlook upon nature. Some time when the present fascination for the newer fields of botanical research broadens out to a full appreciation of the value and relationship of all lines of botanical investigation, the training and knowledge of the old-time systematist will be appreciated as they have not been for many years.

We are inclined, perhaps unconsciously, to measure the worth of men and the extent of their influence by what they publish. Professor Wheeler published little. His real influence among his fellows is not to be estimated in printed pages, but in the unmeasurable inspiration he gave throughout his life to his students and intimate associates everywhere.

One of these friends, drawn to him through a mutual love of plants, has written of him as follows:

March 28, 1910.

MR. C. H. KAUFFMAN,

Vice President of Botany Section,

Michigan Academy of Science.

Dear Sir: Your letter of March 10, which reaches me on my return from a long absence, is the first notification I have had of the death of Charles Fay Wheeler. This is a particular sorrow to me, for I had known Dr. Wheeler intimately and he was one of my very first botanical acquaintances. It was more than thirty years ago that, as a student, I visited him at Hubbardston, Michigan. We had had some kindred correspondence, and his letters were so genial, so full of the love of plants, and so critical as to specific differences that I became possessed of a great desire to see him. I found him in his drug store; but plants and the fields were clearly his first love, and he took me to his collection and to some of his favorite collecting grounds. The carefulness and accuracy of his observation impressed me very much. He seemed to have an eye for critical things and for those that escaped common observation. He was at that time very keen on *Carex* and *Salix* and the grasses. He was always finding forms that did not fit the descriptions in the books; and if any plant was rare he was sure to find it if it grew within his range.

In these years he was isolated from kindred spirits, and he was hungry for botanical acquaintanceship; yet he was so exceedingly modest of his own merits that he hardly dared to seek such comradeship. I have never known a more modest and unassuming man. In later years, of course, he overcame his shyness to a great extent, but he always was content to be the listener and the student. It was a great thing for him and for botany when he was asked to come to the agricultural college and to aid in the botanical work. From that time his work took on a larger aspect, and he became one of the most critical and re-

liable systematic botanists wherever his studies led him. In the days of my botanical work it was always a great delight and support to have his judgment on different plants; and I am sure that this feeling has been shared by many others.

Dr. Wheeler was a steadfast friend. It was a great joy to go afield with him. His keen eyes saw everything, and he enjoyed nature to the full. I shall never have another such a friend. He was a rare clear spirit.

Yours truly,

L. H. BAILEY

The thoughts so well expressed in this letter by Professor Bailey are shared by his many friends in Washington, at the college, in his early village home and elsewhere. Though he lived a quiet, peaceful life his real worth will not be forgotten until those who knew him shall pass as he has done, quietly into the great beyond.

He lies buried in the National Cemetery at Arlington, within sight of the hills on the farther side of the river, where in a soldier's camp he contracted the illness that was perhaps the determining cause of his botanical career.

W. F. WIGHT

AMERICAN MATHEMATICAL PUBLICATIONS

THAT American mathematical activity has been rapidly increasing during the last few decades is a patent fact which has been the subject of considerable comment on the part of European mathematicians. It is, however, difficult to measure this activity accurately and to exhibit its increments in a clear manner. The objects of the present note are to call attention to this interesting problem and to present a few facts which seem to throw some light on it.

One of the most valuable aids for the study of current mathematical literature is the well-known *Jahrbuch über die Fortschritte der Mathematik*. The latest volume of this work lists and comments on about thirty-four hundred articles and books, which appeared during the year 1907. About one twentieth of these were by American authors who belong to the American Mathematical Society. If we compare this with the year 1892 we find that less

than one fiftieth of the total mathematical output was then due to members of the corresponding society. While the total number of papers and books listed increased only about one third during this period of fifteen years those by American authors increased threefold.

This rapid advance is naturally the source of considerable optimism, but further comparisons tend to call attention to the fact that we are still far behind several other countries as regards mathematical work. For instance, although the French Mathematical Society has only half as many members as the American, yet their articles and books listed during 1907 exceed ours by a considerable number; and the German Mathematical Society, with a membership about equal to that of the American when foreign members are excluded, had twice as many publications recorded in this latest volume.

A comparison whose results appear at first as still less complimentary to our mathematical situation relates to the publications of the presidents of some of the leading mathematical societies. The societies selected were as follows: The American Mathematical Society, the London Mathematical Society, La Société Mathématique de France and Die Deutsche Mathematiker-Vereinigung. We took all the presidents of these societies for a period of sixteen years, beginning with 1894 when the American Mathematical Society assumed its present name, and looked up the number of references to their publications during the fifteen years covered by the three general indexes of the *Revue semestrielle des publications mathématiques*. The results were as follows: The average number for each of the nine American presidents is 21, for each of the eight English presidents it is 44, for each of the twelve German presidents it is 63, and for each of the sixteen French presidents it is 88.

In round numbers it thus appears that the presidents of the London Mathematical Society, during the period under consideration, published about twice as often as the presidents of the American Mathematical Society, while in the cases of the German and French